

# MINIATURE MOTOR STRUCTURE

## BACKGROUND OF THE INVENTION

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### 1. Field of the Invention

The present invention relates to a motor structure, and more particularly to a miniature motor structure.

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### 2. Description of the Prior Art

As shown in Fig.1, the stator structure of a conventional miniature motor includes an upper silicon steel 10, a bearing tube 20, a lower silicon steel 30 and a coil 40. Among these, the upper silicon steel 10 and the lower silicon steel 30 are annular in shape. Besides, there are upper side plates 502 or lower side plates 512 extending upward or downward from the outer periphery of the upper silicon steel 10 and the lower silicon steel 30. The cylindrical bearing tube 20 provides a rivet joint so as to joint the upper silicon steel 10, the coil 40 and the lower silicon steel 30 together. Further, the coil 40 is sandwiched between the upper silicon steel 10 and the lower silicon steel 30.

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The disadvantage of the conventional miniature motor at least includes that the bearing tube 20 providing a rivet joint is required for jointing the upper silicon steel 10, the coil 40 and the lower silicon steel 30 together. That is, the conventional miniature motor is not easy to fabricate.

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## SUMMARY OF THE INVENTION

5 The present invention discloses a miniature motor structure omitting the prior bearing tube described above to reduce cost and simplify the required fabricating process.

10 The present miniature motor structure includes a first coil seat, second coil seat, a coil, a circular magnet, a metal housing and a shaft. The first coil seat includes a first bottom plate, a plurality of first outer teeth and a plurality of first inner teeth. The first bottom plate further includes a first central opening. The first outer teeth protrude from the first bottom plate and surround the outer periphery of the first bottom plate. The first inner teeth protrude from the first bottom plate and surround the first central opening. Further, the coil is positioned in the first coil seat.

15 The second coil seat includes a second bottom plate, a plurality of second outer teeth and a plurality of second inner teeth. The second bottom plate further includes a second central opening. The second outer teeth protrude from the second bottom plate and surround the outer periphery of the second bottom plate. The second inner teeth protrude from the second bottom plate and surround the second central opening.

20 The second bottom plate of the second coil seat is formed above the coil and the first coil seat. Besides, each of the second outer teeth is interposed between the adjacent

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first outer teeth. Each of the second inner teeth is interposed between the adjacent first inner teeth. In this manner, the first coil seat and the second coil seat define a space accommodating the coil. In addition, the first inner  
5 teeth and the second inner teeth form a post for winding the coil. By means of the first inner teeth and the second inner teeth, the first coil seat and the second coil seat are coupled to each other. In the preferred embodiment, both of the first coil seat and the second coil seat are made of silicon  
10 steel. However, other magnetic conduction material, such as nickel steel, is applicable to the first coil seat and the second coil seat. The coil may be a preformed coil. Alternatively, the coil may be the coil wound around the post.

15 The first coil seat, the second coil seat and the coil construct the stator of the present invention. The first coil seat and the second coil seat may be identical to each other. That is, the stator may be composed of a first coil seat, an  
20 upside-down first coil seat and a coil. However, the first coil seat may be different from the second coil seat. Besides, the first coil seat and the second coil seat are made of sheet metal.

25 In order to advantageously adjust the angle of magnetic inclination to start the motor, the outer teeth optionally includes a cut corner, an arc and a gap may extending from the outer teeth to the bottom plate.

30 **BRIEF DESCRIPTION OF THE DRAWINGS**

The foregoing aspects and many of the attendant advantages of this invention will become more readily appreciated as the same becomes better understood by reference to the following detailed description, when taken in conjunction with the accompanying drawings, wherein:

Fig.1 depicts the stator of an conventional miniature motor ;

Fig.2(a) depicts the exploded view illustrating the stator of the miniature motor according to the present invention ;

Fig.2(b) depicts the exploded view illustrating the stator and the rotor ;

Fig.2(c) depicts the combined view illustrating the stator and the rotor ;

Fig.3 depicts the exploded view illustrating the miniature motor according to the present invention ;

Fig.4 depicts the magnetization of the circular magnet according to one preferred embodiment of the present invention ; and

Fig.5 depicts another preferred embodiment according

to the present invention.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

5       The present invention discloses a miniature motor structure. As shown in Fig.3, the present miniature motor structure includes a first coil seat 100, second coil seat 200, a coil 300, a circular magnet 500, a metal housing 600 and a shaft (not shown).

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Referring to Fig.2(a), the first coil seat 100 includes a first bottom plate 110, a plurality of first outer teeth 120 and a plurality of first inner teeth 130. The first bottom plate 110 further includes a first central opening 150. The first  
15       outer teeth 120 protrude from the first bottom plate 110 and surround the outer periphery of the first bottom plate 110. The first inner teeth 130 protrude from the first bottom plate 110 and surround the first central opening 150. Further, the coil 300 is positioned in the first coil seat 100.

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Still referring to Fig.2(a), the second coil seat 200 includes a second bottom plate 210, a plurality of second outer teeth 220 and a plurality of second inner teeth 230. The second bottom plate 210 further includes a second  
25       central opening 250. The second outer teeth 220 protrude from the second bottom plate 210 and surround the outer periphery of the second bottom plate 210. The second inner teeth 230 protrude from the second bottom plate 210 and surround the second central opening 250.

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Still referring to Fig.2(a), the second bottom plate 210 of the second coil seat 200 is formed above the coil 300 and the first coil seat 100. Besides, each of the second outer teeth 220 is interposed between the adjacent first outer teeth 120. 5 Each of the second inner teeth 230 is interposed between the adjacent first inner teeth 130 (i.e. the first gap 160). In this manner, the first coil seat 100 and the second coil seat 200 define a space accommodating the coil 300. In addition, the first inner teeth 130 and the second inner teeth 230 form a 10 post for winding the coil. By means of the first inner teeth 130 and the second inner teeth 230, the first coil seat 100 and the second coil seat 200 are coupled to each other. In the preferred embodiment, both of the first coil seat 100 and the second coil seat 200 are made of silicon steel. However, 15 other magnetic conduction material, such as nickel steel, is applicable to the first coil seat 100 and the second coil seat 200. The coil 300 may be a preformed coil. Alternatively, the coil 300 may be the coil wound around the post. Of course, the coil 300 has insulating surface so as to 20 electrically isolate the first coil seat 100 and the second coil seat 200.

Referring to Fig.2(a)-Fig.2(c), the first coil seat 100, the second coil seat 200 and the coil 300 shown in Fig.2(a) 25 construct the stator 260 of the present invention. Referring to Fig.2(a), note that the first coil seat 100 and the second coil seat 200 may be identical to each other. That is, the stator 260 may be composed of a first coil seat 100, an upside-down first coil seat 100 and a coil 300. However, 30 the first coil seat 100 may be different from the second coil

seat 200. Besides, the first coil seat 100 and the second coil seat 200 are made of sheet metal.

5 Additionally, as shown in Fig.2(b) and Fig.2(c), the present invention further includes a circular magnet 500, a metal housing 600 and a shaft (not shown). Among these, the circular magnet 500 surrounds the stator 260 and serves as the rotor of motor according to the present invention. The metal housing 600 surrounds the circular magnet 500  
10 and used to avoid magnetic leakage. The Fig.2(c) illustrates the resulting structure after the stator 260 couples to the circular magnet 500.

As shown in Fig,4 illustrating the preferred embodiment  
15 of magnetization of the circular magnet 500, there are even-numbered magnetic sections. Besides, the polarities of the adjacent magnetic sections are opposite to each other.

The present miniature motor is applicable to a fan  
20 structure. As shown in Fig.3 illustrating the exploded view of the embodiment, the frame 700 having the board 800 formed thereon is provided. Then, the stator 260 consisting of the first coil seat 100, the second coil seat 200 and the coil 300 is mounted on the board 800. After that, the  
25 circular magnet 500 and the metal housing 600 are sequentially formed on the stator 260. Finally, the shaft (not shown) couples the stator 260 to the blade structure 900.

30 Another embodiment of the present invention is shown



in Fig.5. In the first coil seat or the second coil seat, the number of the outer teeth may be different from or the same with the number of the inner teeth. For example, the first coil seat 100 shown in Fig.5 includes four first outer teeth 5 120 and three first inner teeth 130. In the first coil seat 100 shown in Fig.2(a), the number of the first outer teeth 120 is the same with the number of the first inner teeth 130. Besides, in order to advantageously adjust the angle of magnetic inclination to start the motor, the outer teeth 10 176 optionally includes a cut corner 170, an arc 174 and a gap 176 may extending from the outer teeth to the bottom plate.

According to the present invention, the first coil seat and the second coil seat are coupled to each other by 15 self-inner teeth so that the prior bearing tube, such as the element 20 shown in Fig.1, can be omitted. Therefore, the present invention simplifies the manufacturing process and thus reduces cost.

20 As is understood by a person skilled in the art, the foregoing preferred embodiments of the present invention are illustrated of the present invention rather than limiting of the present invention. It is intended to cover various modifications and similar arrangements included within the 25 spirit and scope of the appended claims, the scope of which should be accorded the broadest interpretation so as to encompass all such modifications and similar structure.